Astronomy: Earth and Space Systems

8-4 The student will demonstrate an understanding of the characteristics, structure, and predictable motions of celestial bodies. (Earth Science)

8.4.9 Recall the Sun's position in the universe, the shapes and composition of galaxies, and the distance measurement unit (light year) needed to identify star and galaxy locations.

Taxonomy level: 1.2-A Remember Factual Knowledge

Previous/Future knowledge: This indicator contains new conceptual material. Students will expand on this knowledge in high school Earth Science as they then develop understanding of the classifications of stars (ES-2.5), the life cycle of stars (ES-2.7), and how gravity and motion affect the formation and shapes of galaxies (ES-2.8).

It is essential for students to know that:

- The Sun is a star in the Milky Way galaxy located in a spiral arm about two-thirds of the way from the center of the galaxy.
- *Galaxies* are made up of gas, dust, and billions of stars and have different shapes –
  - *elliptical* – spherical or flattened disks,
  - *spiral* – a nucleus of bright stars and two or more spiral arms, or
  - *irregular* – no definite shape
- Because distances in space are so great that conventional numbers are too large to work with, astronomers use a unit of measurement called *light year* to measure the distance to stars and galaxies in space. The distance in one light year is equal to the distance light travel in one year.

NOTE TO TEACHER: Students may come with a misconception that the Milky Way galaxy is in the solar system because they may have seen the band of stars in the night sky. The relationship between objects within the solar system and those out in the universe is an important concept to form accurately at this time.

It is not essential for students to know other characteristics of the Milky Way galaxy, or how galaxies came to have their shapes, or the characteristics of the stars in the various galaxies. The study of stars, their magnitudes, classifications and life cycle, is not included with this indicator. Using the measurement, astronomical unit, and parallax to determine distances in space is also not necessary.

Assessment Guidelines:

The objective of this indicator is to *recall* the Sun's position in the universe, the shapes and composition of galaxies, and the measurement unit light year; therefore, the primary focus of assessment should be to remember what is needed to identify star and galaxy locations. However, appropriate assessments should also require students to *identify* the name of Earth's galaxy or the meaning of light year.